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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/694,339 | 10/27/2003 | Gregg M. Gallatin | FIS920030110US1 | 3834 |

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| EXAMINER | |
|---|---|
| DOAN, NGHIA M | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2825 | |

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/694,339 | GALLATIN ET AL. | |
| | Examiner | Art Unit | |
| | Nghia M. Doan | 2825 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *27 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,10-17,19 and 21-30* is/are rejected.

7)☒ Claim(s) *7,9,18,20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner. (See PTO-948)

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/27/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. Responsive to communication application 10/694,339 filed on 10/27/2003, claims 1-30 are pending.

### *Drawings*

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**3. Claims 1- 6, 8, 10-17, 19, and 21-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (Kim) (6,484,300) in view of D'Haeseleer et al. (D'Haeseleer) (US 5,619,419).**

4. **With respective to claims 1, 16, 29, and 30**, Kim discloses a method and computer programming (col. 2, ll. 62-65) obtain an effective pattern density for performing cell placement in layout with a plurality of finite geometrical shapes (fig. 4, --which is having different patterns--).

(as claims 1, 16, 29, and 30) a layout defines a pattern layer is divided (partitioned) into a plurality cells (col. 3, ll. 42-43). A percentage of the pattern occupying area in each pattern is computed as the pattern density for each pattern cell, to obtain an effective pattern cells (neighboring cells) based on computed distance (--interaction map based on a density map --)(col. 3, ll. 43-51), the pattern map data is used in manufacturing a photomask (reticle), which is used in a photolithography process with

respect to the corresponding layer. The data structure of a pattern map data may be converted, since the hierarchical pattern map data may be converted into non-hierarchical (planar) pattern map data (col. 7, ll. 42-50). The result of pattern map data from the design layout is stored with a hierarchical data structure, which is reduce amount of data to be stored and facilitate data correction in designing (col. 7, ll. 35-41).

Kim does not teach (as claims 1 and 29) method of truncating said interaction map to generate a map of truncated cells; grouping substantially identical occurrences of select ones of said truncated cells into a single bucket; and (as claims 16 and 30) segregating substantially identical groupings of said truncated cells respectively into differing ones of a plurality of buckets;

D'Haeseleer teaches (as claims 1 and 29) a method computing a density map for placement and at least suggests that dividing the placement into a grid of rectangular (or square) blocks (truncating interaction map to generate a map of truncated cells)(fig. 8, col. 7, ll. 25-29) and grouping truncated cell into a cluster, which cells have same or identical functionalities or characteristic (col. 8, ll. 20-23). (as claims 16 and 30) Figures 9 and 10 at least suggest segregating substantially identical group of blocks B, D, H (fig. 10) have cell density of zero, group of blocks A, E, and G have cell density of one, while block C is two and block F is three (col. 8, ll. 53-57).

It would have been obvious at the time of invention was made to one of ordinary skill in the art would combine the Kim and D'Haeseleer references for determining a density of a pattern by dividing a placement into plurality pattern of cells (Kim, col. 3, ll. 42-45). D'Haeseleer suggests another technique of computing a density of a pattern

that dividing (truncating) a placement into a grid of rectangular (or square) blocks, (clustering) grouping identical cells and segregating them corresponding to their coverage density in a grid (D'Haeseleer, fig. 8-10 and the description, and col. 7, ll. 25-29). The technique computing a pattern density of D'Haeseleer is improving and optimizing cells placement and an efficient interconnection or routing scheme between devices to obtain desired functionality, such as legal, feasible, and realizable placement. Therefore, determining density of a pattern is considered in fabricated process, that allows further increase in accuracy in prediction and improved space in a wafer, lower cost and improve yield, and especially that is enable a highly optimized placement to be produced in a relatively short period of time.

5. **With respective to claims 2-3, 12-15, and 25-28**, as the set forth of claims rejected above, Kim further discloses (as claims 2-3) that desired design data hierarchy has plurality levels (stacked layers) are coming from the pattern map result, which is using in a photolithography process with respect corresponding layer. (as claims 12-15, 25) The pattern map data from the layout design may be stored with a hierarchical data structure (different single blocks), which can facilitate data correction in design (desired design data). (as claims 26-28) The data structure (hierarchical structure) of the pattern map data may be converted into non-hierarchical pattern map data (new design data) (at least suggest at Kim, col. 7, ll. 30-60).

6. **With respective to claims 4-6, 8, 10-11, 17, 19, and 21-24** as the set forth of claims rejected above, further comprising: Kim discloses (as claims 4-5, 17, and 23-24) the layout defines a patterned layer is divided in to a plurality of pattern cells (Kim, col.

3, ll. 42-44), which are finite geometrical shapes comprises a plurality of polygons (fig. 4), wherein said plurality of polygons are in rectangular shape (blocks), which is one of regular polygon (at least suggest at Kim, fig. 4). (as claims 6, 8, 10, 19 and 21) the percentage coverage (occupying) area in each pattern is computed as the pattern density of each pattern cell, for each of the pattern cells, as function of the distances of respective to other cell (neighboring cell) (col. 3, ll. 14-20 and ll. 43-51) and the pattern cells are mapping in rotated version ( col. 11, ll. 52-55).

Kim does not teach (as claims 10-11, and 21) method of truncating said interaction map to generate a map of truncated cells; grouping substantially identical occurrences of select ones of said truncated cells into a single bucket; and (as claim 22) segregating substantially identical groupings of said truncated cells respectively into differing ones of a plurality of buckets.

D'Haeseleer teaches (as claims 10-11 and 21) a method computing a density map for placement and at least suggests that dividing the placement into a grid of rectangular (or square) blocks (truncating interaction map to generate a map of truncated cells)(fig. 8, col. 7, ll. 25-29) and grouping truncated cell into a cluster, which cells have same or identical functionalities or characteristic (col. 8, ll. 20-23). (as claim 22) Figures 9 and 10 at least suggest segregating substantially identical group of blocks B, D, H (fig. 10) have cell density of zero, group of blocks A, E, and G have cell density of one, while block C is two and block F is three (col. 8, ll. 53-57).

It would have been obvious at the time of invention was made to one of ordinary skill in the art would combine the Kim and D'Haeseleer references for determining a

density of a pattern by dividing a placement into plurality pattern of cells (Kim, col. 3, ll. 42-45). D'Haeseleer suggests another technique of computing a density of a pattern that dividing (truncating) a placement into a grid of rectangular (or square) blocks, (clustering) grouping identical cells and segregating them corresponding to their coverage density in a grid (D'Haeseleer, fig. 8-10 and the description, and col. 7, ll. 25-29). The technique computing a pattern density of D'Haeseleer is improving and optimizing cells placement and an efficient interconnection or routing scheme between devices to obtain desired functionality, such as legal, feasible, and realizable placement. Therefore, determining density of a pattern is considered in fabricated process, that allows further increase in accuracy in prediction and improved space in a wafer, lower cost and improve yield, and especially that is enable a highly optimized placement to be produced in a relatively short period of time.

***Allowable Subject Matter***

7. Claims 7, 9, 18, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: As claims 7 and 18, Kim and D'Haeseleer are lacks to teach the limitation " the step of convolving said plurality of density to generating said interaction map".

As claims 9 and 20, Kim and D'Haeseleer are lacks to teach the limitation " assigning a reference designator denote substantially identical truncated cells"

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nghia M. Doan whose telephone number is 571-272-5973. The examiner can normally be reached on 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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